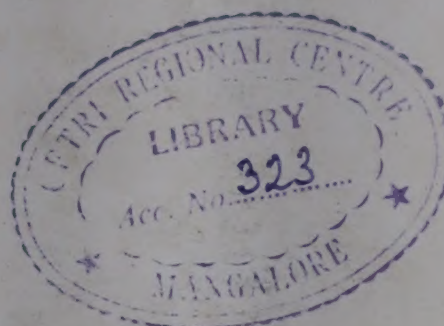
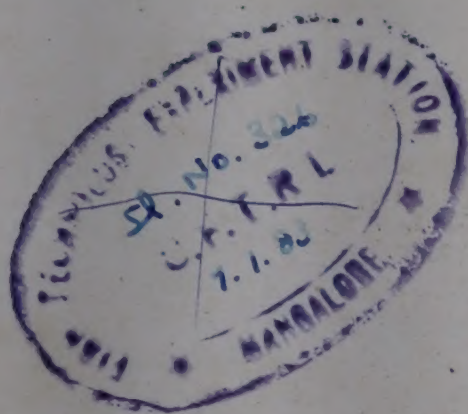


COUNTRY REPORT - THAILAND

AGRO - INDUSTRIES IN THAILAND

PRESENT AT

**FAO/UNDP TECHNICAL CONSULTATION ON THE PROMOTION OF
AN ASIAN NETWORK FOR TECHNOLOGY TRANSFER IN AGRO - INDUSTRIES**



AUGUST 24 - 28, 1981

**INSTITUTE OF FOOD RESEARCH AND PRODUCT DEVELOPMENT
KASETSART UNIVERSITY
BANGKOK**

BY
Dr. PRASERT SAISITHI
ACTING DIRECTOR
IFRPD

TABLE OF CONTENTS

Content	Page
I. Geographical Background	1
II. National Profile	2
III. The Government's Policy	32
IV. Concise Information about IFRPD	44
V. Role of IFRPD in Agro-Industries	61



LIST OF TABLES

Table		Page
1	Estimated Value of Principal, Agricultural, Forestry, and Fishery Products, According to Farmer Received, 1977-1978	13
2	Some important Crops: Planted area (rai), and Production (tons), 1978	14
3	Annual Catches of Marine and Fresh Water Fishes: Quantity, 1977	14
4	Quantity and Value of Agricultural Export, 1977-1978	15
5	Quantity and Value of Agricultural Import, 1977-1978	22
6	Gross Domestic Product	26
7	Income per Worker by Main Occupations in 1976	26
8	Production Targets Classified by Sector	34
9	Major Production Targets	35
10	Major Production Targets	37
11	Average Annual Increase in Production of Major Agricultural Commodities	37
12	Exports Item	38

LIST OF FIGURES

Figure		Page
1	Agro-Economic Zone of Thailand	7
2	Annual Catch of Fresh Water Fish: Quantity and Value 1963-1977	9
3	Annual Catch of Marine Fish: Quantity and Value 1963-1967	9
4	Comparison of Annual values of Agricultural Export and Total Exports, Thailand 1966-78	10
5	Comparision of Annual Values of Agricultural Imports and Total Imports, Thailand 1966-78	10
6	Comparison of Annual Export and Imported Values of Whole Commodities, Thailand 1966-78	11

AGRO-INDUSTRIES IN THAILAND

Geographical Background

Thailand is situated in the middle of "Golden Peninonla", surrounded by Burma, Laos, Cambodia, and Malaysia with the outer ring neighbors such as North Vietnam, South Vietnam and Singapore.

The country formerly known as Siam, is as big as Spain or about two third of the Texas State. It is divided into 4 geographical parts namely mountainous north, northeastern highland, the central plain of fertile land where most rice is produced, and the hilly and coastal southern part which is rich in minerals, rubber plantation and marine resources. The total area of 542,373 km² is divided into 72 provinces, each with a Governor ruling the province in linkage to the Central Government. These provinces are officially grouped according to its prefecture into 6 regions excluding Bangkok: North, Northeast, Central, East, West, and South.

Thailand is a democratic country under constitution having the cabinet to rule the country through the parliament. People of Thailand still recognize their King as the Chief of the State. The King exercises his legislation function through the National Assembly, the executive function through the cabinet, and justice power through the court.

Most of the people in Thailand are Bhuddists. The population of Thailand increases to 47 millions in 1980 and the

country was ranked sixteenth for the population in the world. The growth rate at present is as high as 2.1 per cent but this is still 0.9 per cent lower than in 1969. If age grouping these 47 millions people, it was found that the children younger than 15 years old is 41 per cent while group of adults aging between 15-59 years of age is 54 per cent with the rest 5 per cent falls into group of people over 60 years of age.

About 83 per cent of total population or amount to 39 millions people live in sub-urban or rural area of the country and 70 per cent of these people are farmers. In 1976 the annual income of a farmer was approximately 3,450 bahts per capita while the average annual income per capita of all other occupations was 7,580 bahts. This big difference of income between people who live in towns and up-country has created many problems for the development of the country.

The education of people in this agricultural group is quite inadequate. About 75 per cent of them have only passed the compulsory school and only 3 per cent having as high as a certificate from the secondary school. The number of people working in the field of agriculture has increased from 65 per cent in 1974 to 74 per cent in 1978.

NATIONAL PROFILE

1. General Statistics

Land Use:

Total land, whole kingdom	321.25 millions rai
Cultivated area:	109 " "
irrigated area	20.07 " "
non-irrigated area	87 " "
Forest area:	82 " "

Population: 47.49 millions in 1980 with annual growth
rate of

2.1 per cent

41 per cent under 15 years

54 per cent between 15-59 years

5 per cent over 60 years

Religion: predominantly Bhuddist

Capital city: Bangkok Metropolis with population of
5,153,902 in the year 1979-1980.

Tourism: 1,591,455 visitors spending U.S.\$ 562 millions

2. Economic:

Currency: Baht

Official exchange rate in units of national
currency per U.S. dollar: Baht 23.05 = U.S.\$ 1
(August 1981)

Economics: National income	378.5 billion baht
Gross Domestic Product (1976)	337,635 million baht
Per Capita Income (1978)	8,370 baht
Cash Income from Agricultural Sector per farm (1977)	12,223.84 baht

Agricultural Production (1976) 65,898 million baht

Non-Agricultural Production (1976)

155,267 million baht

Manufacturing Production (1976) 42,529 million baht

Export (1976) 210,554 million baht

Import (1976) 248,233 million baht

Some Major Products (1978):

Agriculture:

Rice 17.47 million tons

Maize 2.79 million tons

Cassava 15.04 million tons

Sugar Cane 20.56 million tons

Soybeans 158,929 tons

Mungbeans 258,972 tons

Kenaf 337,814 tons

Cotton 74,418 tons

Tobacco 46,200 tons

Rubber 467,000 tons

Marine and Fresh Water Fishes (1977)

2.19 million tons

Road Network: Total length of all types of road: National

highways 12,658, feeder roads 16,659,

rural and local roads, roads on

irrigation dikes (1,770) increased to

31,087 kilometers

Airport : Bangkok International Airport at Don Muang

Service for passengers 5,757,958 persons
incoming & outgoing flights 54,718 flights
in board & outboard cargoes 131,695 metric
tons

Mining :

Tin	48,000 tons
Tungsten	329 tons
Antimony	494 tons

3. Social:

Labour force:

About 44 % of total population
(21,601,000 in 1981)

Employment	20,398,000
------------	------------

Unemployment	1,203,000
--------------	-----------

Unemployment rate averages about 5.0
per cent

Minimum wage per day 35. baht

Health:	Birth rate per people	1,000: 21.0
	Death rate per people	1,000: 5.2
	Number of Students	8.089 million
	Doctor/Population	1: 6,7500
	Nurse/Population	1: 1,430
	Hospital bed/Population	1: 640

Education:	Literacy	86 %
	Primary schools	31,100
	Secondary schools	3,758
	Universities	14

According to the utilization of land for agricultural operations, Thailand is divided into 4 regions; the Northern region consists of 17 provinces. North Eastern Region 16 provinces, the Central plain Region 25 provinces and the Southern Region has 14 provinces. The area is also divided into 19 agro-economic zone with certain major crops in each zone as shown in Figure 1.

The Center for Agricultural Statistics has reported land utilization for agricultural operations of the whole Kingdom for the year 1977-1978 as follows:

Total land	321,250,000	rai
Farm holding land	113,796,436	rai
Housing area	2,691,846	rai
Paddy land	71,497,303	rai
Under field crops	23,324,732	rai
Under fruit tree & tree crops	10,074,959	rai
Under vegetables & flowers	333,068	rai
Idle land	3,102,332	rai
Gross land	323,978	rai

FIGURE 1. Agro-Economic Zone of Thailand



- | | |
|----|--|
| 1 | Tobacco, cattle, buffalo, silk, cassava. |
| 2 | Kenaf, silk, cattle |
| 3 | Cattle, buffalo, kenaf, silk, cassava. |
| 4 | Cattle, buffalo, kenaf, silk, corn, cassava |
| 5 | Corn, kenaf, cattle, silk, castor, cassava, |
| 6 | Corn, sorghum, tobacco, Cotton, mungbean, soybean |
| 7 | Corn, mungbean, cotton, soybean, sorghum |
| 8 | Soybean, groundnut, corn, mungbean, |
| 9 | Cotton, tobacco, soybean, Cattle, buffalo |
| 10 | Tobacco, soybean, cattle, Buffalo |
| 11 | Rice, Diversification crops in paddy field, sugar cane |
| 12 | Cattle, sugarcane, cassava, corn, cotton, castor |
| 13 | Rice, cassava, buffalo |
| 14 | Marine fisheries, coconut |
| 15 | Cassava, sugarcane, Marine fisheries |
| 16 | Para-rubber, fruit-trees, Marine fisheries |
| 17 | Rice, Para-rubber, coconut Cattle, Buffalo, coffee, Marine fisheries |
| 18 | Para-rubber, coconut, Marine fisheries |
| 19 | Para-rubber, coconut, Fruit-trees, coffee |

Others	2,448,218 rai
Unclassified	207,453,564 rai

The estimated value of principal agricultural, forestry and fishery products, according to farmer received in 1978 is shown in Table 1, 2, 3 and also Figure 2 and 3 respectively. The quantity and value of agricultural export and import are also shown in Table 4, 5 and Figure 4, 5, 6.

In 1980, Paddy land occupied approximately 50-60 per cent of total area of holdings. Other 30 per cent was used to grow field crops especially maize, cassava, sugar cane, kenaf, tobacco, kapok, pineapple, soybeans and mungbeans. As for the production of livestock and poultry, buffaloes, cattle, swine and poultry were accounted for the major goods giving the estimated value of 3.2-5.2 per cent of GNP or about 10.1-11.4 of the agricultural sector.

Annual catches of marine and fresh water fishes has increased from 1,699 metric tons in 1976 to 2,190 metric tons worth 8,829.0 million baht in 1977. Thailand is among the top ten countries of the world in fishery production and is the highest producer of fishes in Southeast Asia. Thailand has 12,529 registered fishing boats and about 65,000 fishermen or equal to 0.5 per cent of total workforce of the agricultural sector. In 1978, the fishery products for export was 235,386 tons with the estimated

FIGURE 2: ANNUAL CATCH OF FRESH WATER FISH: QUANTITY AND VALUE 1963-1977.

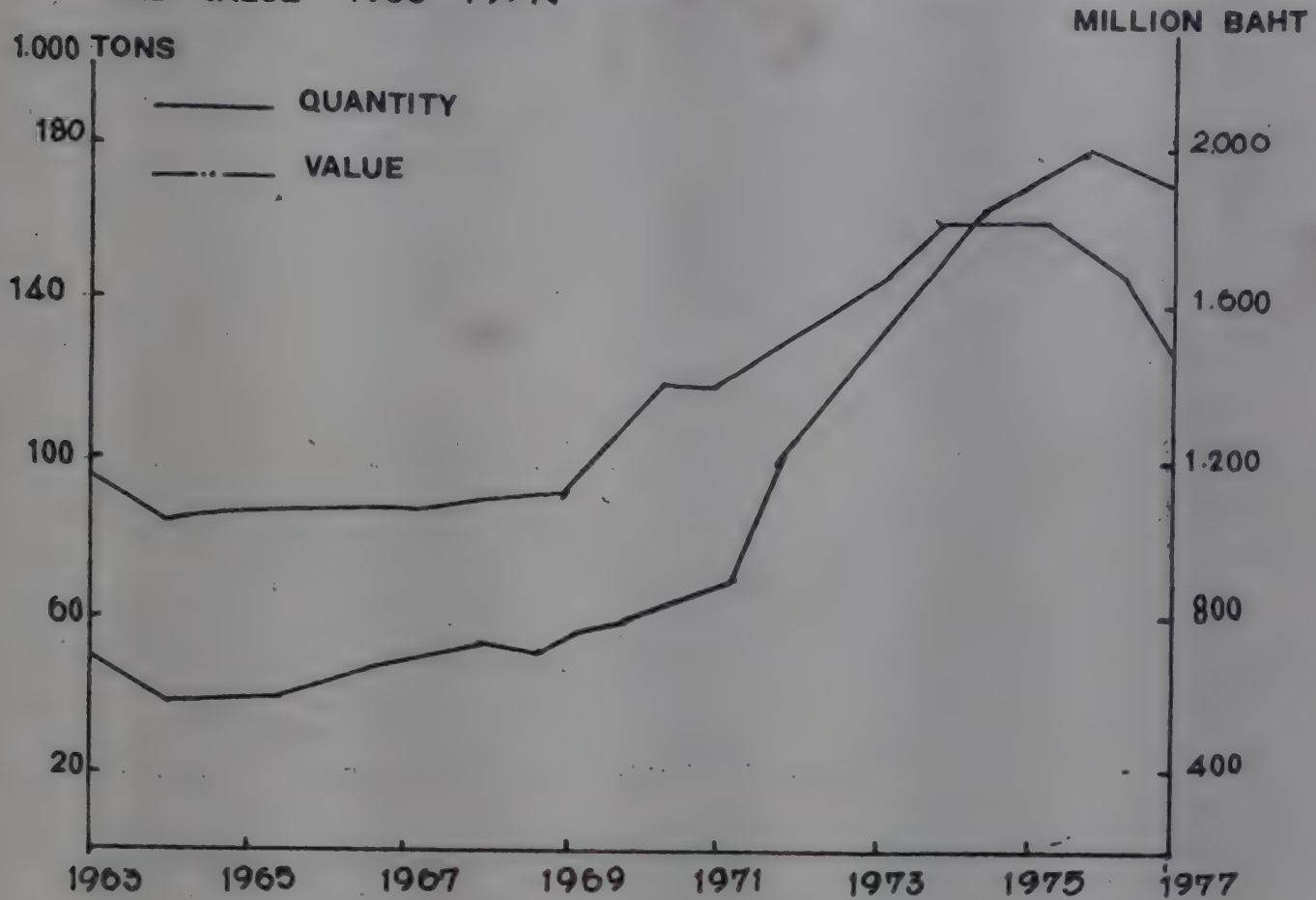


FIGURE 3: ANNUAL CATCH OF MARINE FISH: QUANTITY AND VALUE 1963-1977.

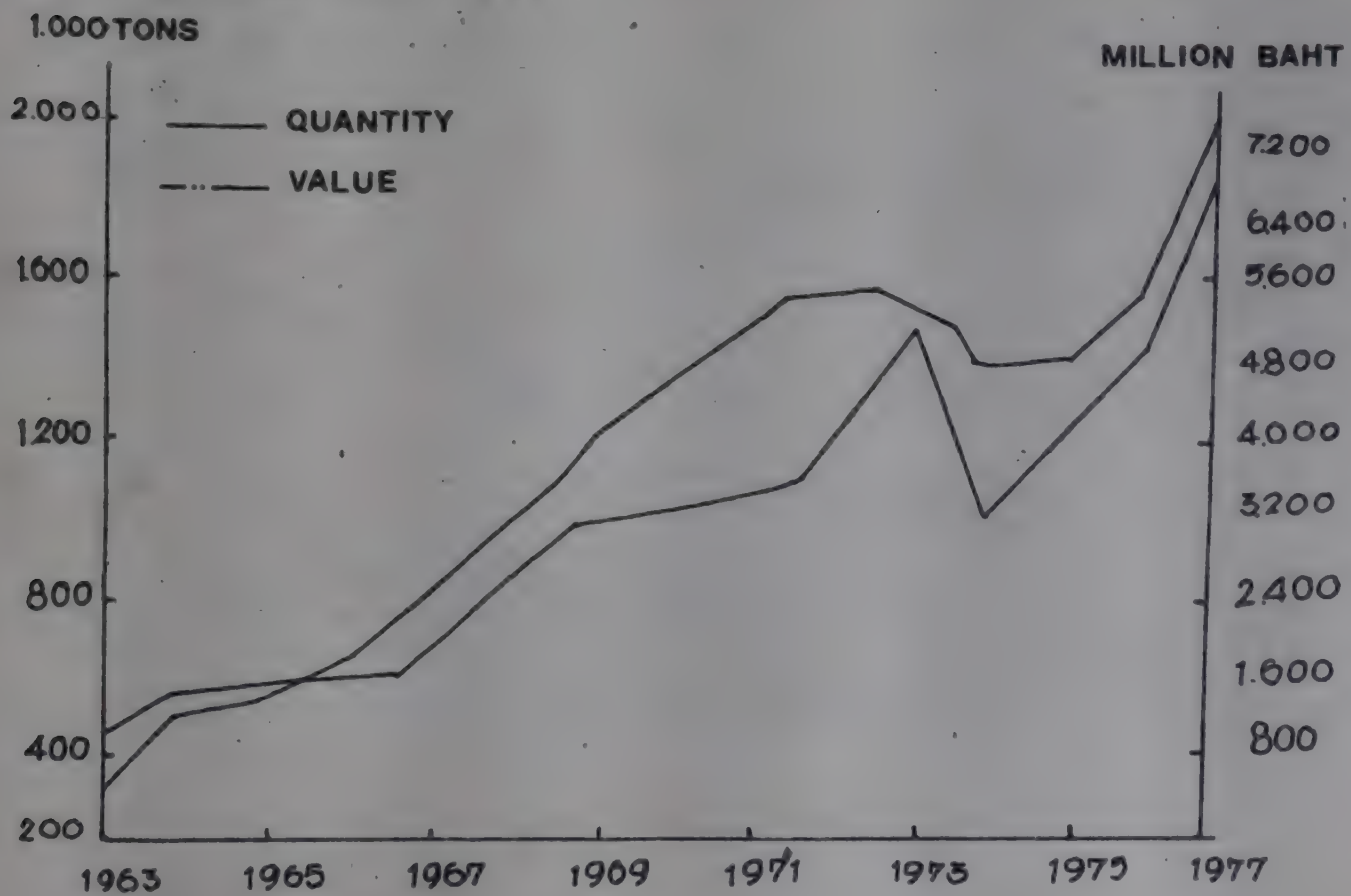


FIGURE 4 : COMPARISON OF ANNUAL VALUES OF AGRICULTURAL EXPORT AND TOTAL EXPORTS, THAILAND 1966-78

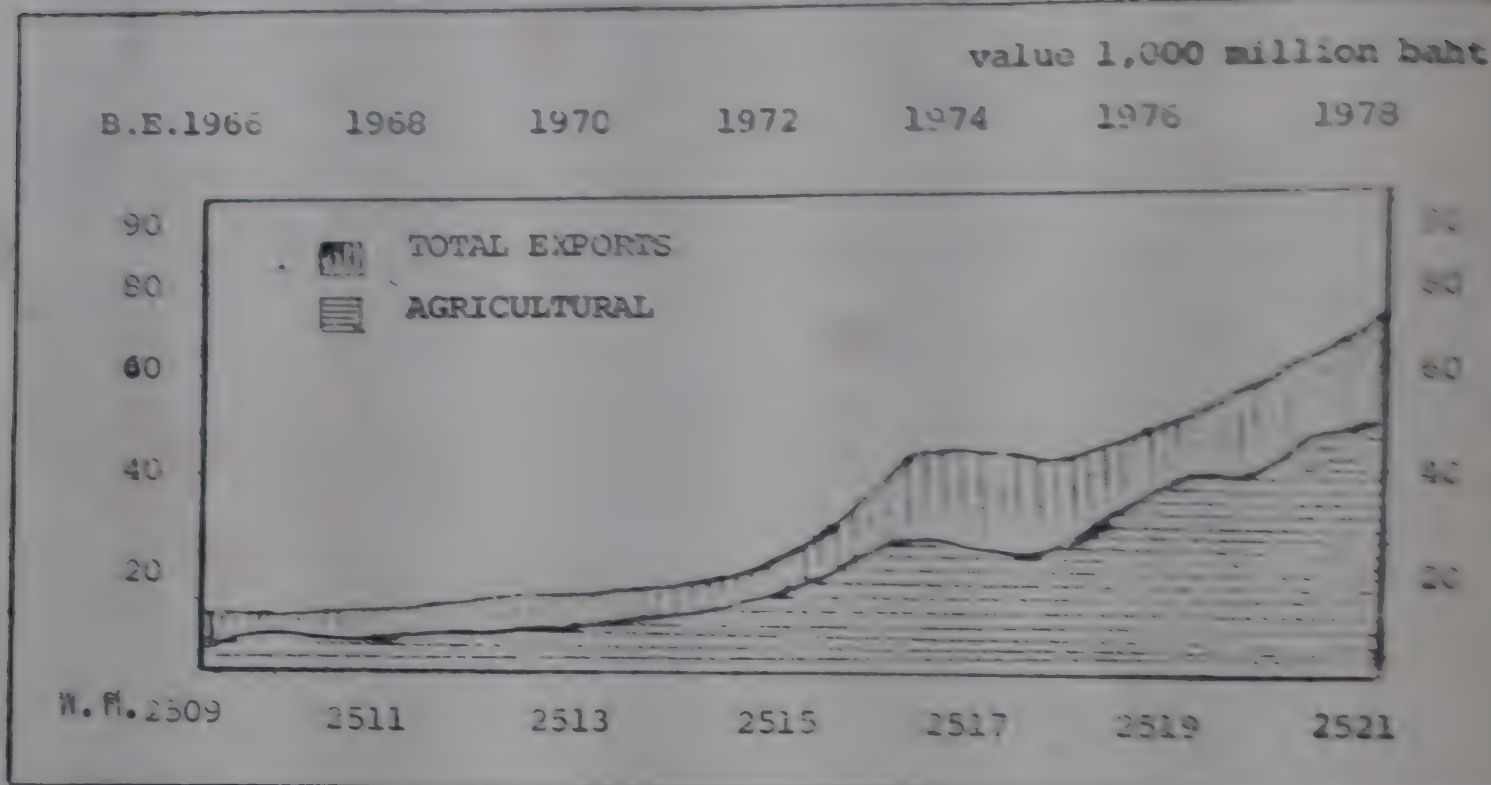


FIGURE 5 : COMPARISON OF ANNUAL VALUES OF AGRICULTURAL IMPORTS AND TOTAL IMPORTS, THAILAND 1966-78

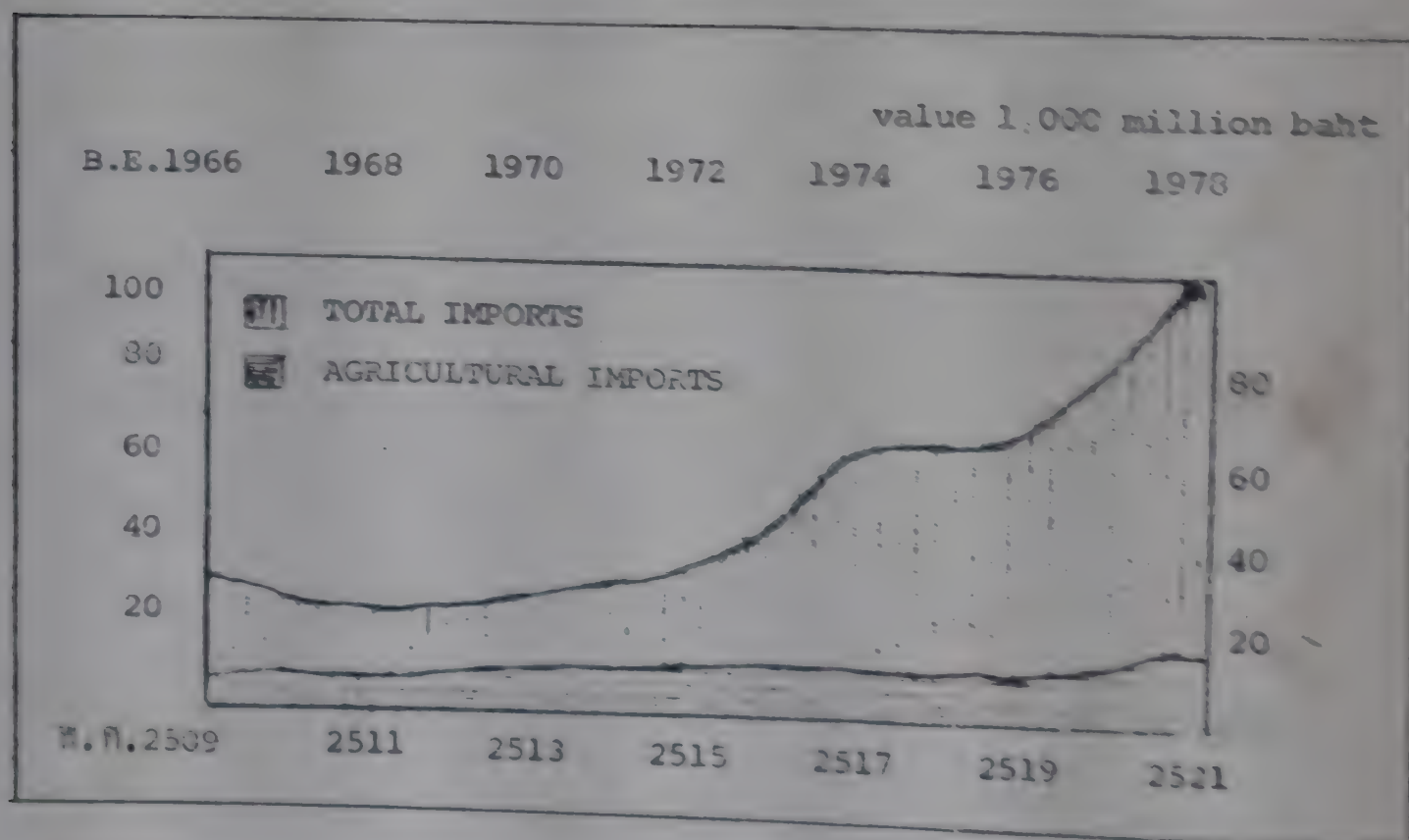
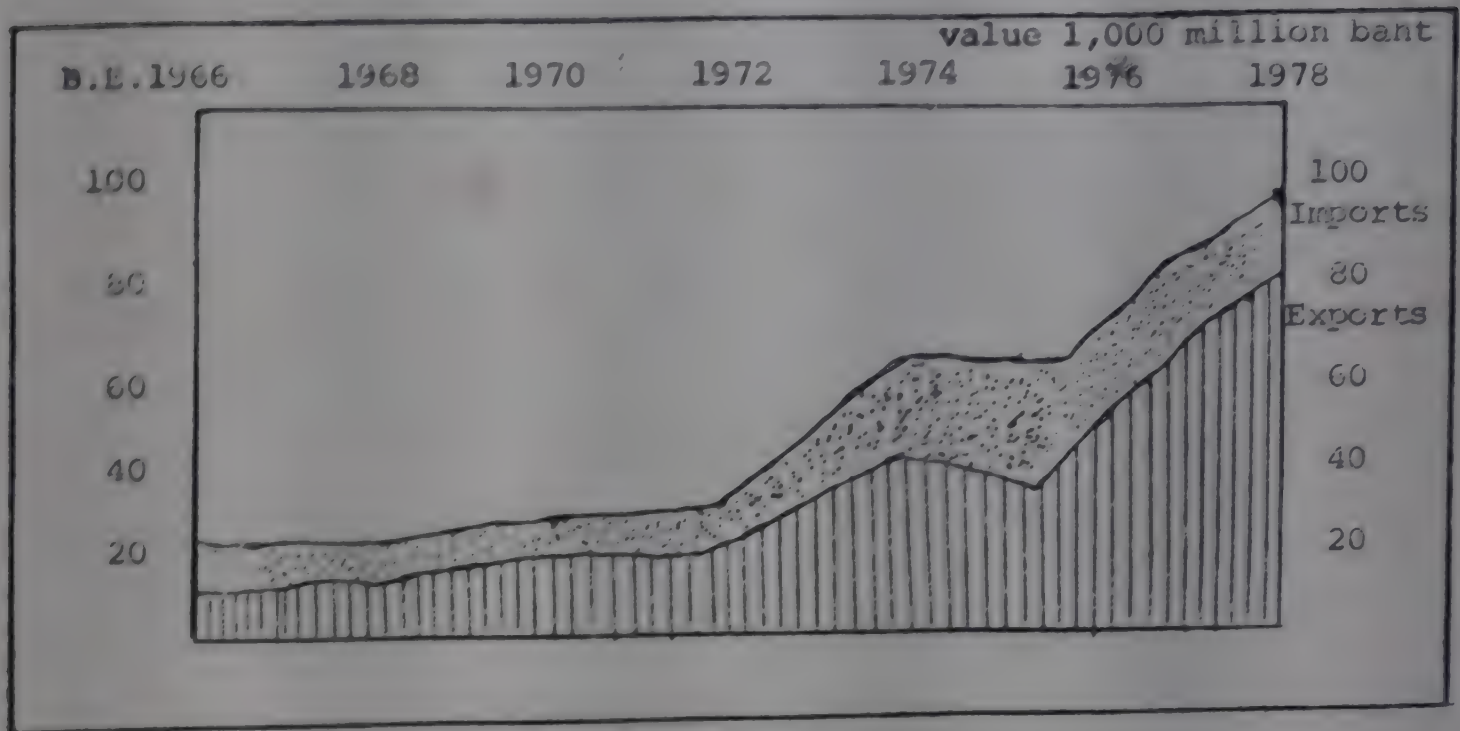


FIGURE 6 : COMPARISON OF ANNUAL EXPORT AND IMPORT VALUES OF
WHOLE COMMODITIES, THAILAND 1966-78



value of 5,086 million baht or 5 per cent of the total domestic export.

Eventhough the quantity of marine fishes shrimps, mussels and clams, crabs and squid caught has increased rapidly but the quantity of Indo-pacific Mackerel caught was greatly reduced to 49 per cent of 1970. The quantity of trash fish caught was three times up thus the consumption was reduced from 74 per cent to 53 per cent in 1977 and there was more utilization for animal feed, fertilizer, and fish protein concentrate. Approximately 59 per cent of total quantity of these marine fishes, 5,016 million baht in value, were caught by the use of trawl-net, otter-board trawl-net, two-boats trawl-net and otter-beam trawl-net. The catching of fresh water fishes was only 8 per cent of total fishery products. Its value of 1,816.31 million baht was quite significant for the economics status of the country.

Thailand is an agricultural country with increasing industrial development. The Gross Domestic Product was found to be 370,400 million baht in 1977 (Table 6) and the Income per worker by main occupations in 1976 was shown in Table 7. The actual rate of growth of the production in the agricultural sector during the Third Plan (1972-1976) was 3.9 while that of the manufacturing production expanded at an average rate of 8.6. The Domestic exports was found to be 81,251,801,000 baht and re-exports was 1,813,225,000 baht giving total exports of 83,065,026 in value while that of total imports equalled to 108,898,828,000 baht.

Table 1: Estimated value of Principal, Agricultural, Forestry,
and Fishery Products, According to Farmer Received,
1977-1978.

Unit : million baht					
Products	Farm Value		Products	Farm Value	
	1977	1978		1977	1978
<u>Rice</u>	32,964.1	3,888.8	Rubber products	4,089.45	5,888.5
Paddy	32,964.1	3,888.8	Sheets	4,089.45	5,888.5
<u>Upland seed crops</u>	15,348.7	18,628.4	Forestry products	2,965.2(r)	2,533.4
Maize, shelled	2,749.5	4,492.8	Teak	415.3	353.6
Mung beans	1,173.2	1,294.9	Yang	623.6	407.6
Cassava roots	5,814.8	6,807.6	Other timber	1,685.0	1,526
Sugar canes	5,415.7	5,715.8	Charcoal, Firewood	150.2(r)	147
Sorghum	195.5	317.3	Yang oil	51.4	19.5
<u>Oil seeds</u>	3,022.3(r)	3,830.8(r)	Gum damar	0.1	0.2
Castor beans	176.6	185.7	Bamboo	26.6	76.7
Ground nuts	489.0	640.2	Cork	1.0	1.4
Soy beans	540.2	856.6	Other	12.0	-
Sesame seeds	208.9	257.3	Livestock & livestock		
Coconuts	1,607.6(r)	1,301.0	Products	28,903.2(r)	29,329.8
<u>Fibers</u>	2,012.1(r)	2,184.6	Buffaloes	2,977.5	3,277.4
Cotton	678.9(r)	593.1	Cattle	3,209.8	3,792.4
Kapok and Bombax	364.6(r)	412.5	Swines	12,391.3	10,937.2
Kenaf	968.6(r)	1,179.0	Poultry	3,996.6(r)	4,145.8
<u>Other crops</u>	24,303.6(r)	27,568.2	Eggs	6,265.0(r)	7,099.0
Chilli,	1,876.4	1,917.4	Fresh Milk	63	78.0
Onion and shallot	1,223.6	1,625.2			
Garlic	1,826.6	2,000.8	Fishery products	10,660.5	13,828.1
Tobacco (Virginia)	1,212.0	1,282.6	Fish, fresh water	2,038.3	2,369.4
Vegetable	4,835.0	5,958.2	Fish marine	8,622.2	11,458.7
Fruits	13,330.0(r)	14,784.0			
Total			124,268.45(r) 107,680.0		

Table 2: Some Important Crops; Planted area (rai), and Production (tons)
1978

Products	Planted area (rai)	Production (tons)	Products	Planted area (rai)	Production (tons)
Food Crops:			Fiber Crops:		
Rice	56,604,000	17,470,000	Cotton	428,514	74,419
Maize	8,661,309	2,790,575	Kenaf	2,002,795	337,814
Cassava	6,313,000	15,048,000	Kapok	313,000 (p)	30,000
Sugar cane	3,190,308	20,560,523	Other Crops:		
Mungbean	2,638,082	258,972	Chilli Dried	239,400	62,700
Oil Crops:			Shallot & Onions	141,300	139,500
Soybeans	1,010,410	158,929	Garlic	251,800	150,100
Groundnuts	660,333	127,531	Tobacco Virginia	283,000 (p)	46,200
Castor bean	271,000	37,300	Rubber	9,426,000	467,000
Sesame	289,000	29,900			
Coconut	2,574,000 (p)	860,000 (p)			

p = Primary data

Source: Thailand:Office of Agricultural Economics

Table 3: Annual Catches of Marine and Fresh Water Fishes: Quantity, 19

	Quantity (1,000 tons)	Value (million baht)
Fresh water fishes	122	1,861.0
Marine fishes	2,068	6,968.0
Total	2,190	8,829.0

Source: Department of Fisheries

Table 4: Quantity and value of Agricultural Export, 1977-1978

Export, 1977-1978	Unit:			
	Quantity : tons		Value : 1,000 baht	
Item	1977		1978	
	Quantity	Value	Quantity	Value
Total of rice exports	2,855,434	13,382,844	1,606,752	10,424,042
White rice				
Head A	767,573	3,978,561	588,656	3,979,993
Head other	950,453	4,136,305	156,305	758,148
Broken	379,068	1,323,243	208,756	929,804
Glutinous rice				
Head	138,183	516,564	34,042	270,880
Broken	3,892	11,386	1,448	7,250
Rice cargo	41,119	188,562	20,183	121,762
Rice parboiled	623,096	3,149,694	596,984	1,354,855
Rice n.e.s.	43,050	78,534	378	1,350
Rice Products				
White rice flour	25,521	90,947	29,484	127,736
Glutinous rice flour	8,707	41,639	10,580	68,451
Vermicelli made from rice	7,050	50,144	9,004	63,817
Food Crops				
Maize	1,517,878	3,286,522	1,954,578	4,230,994
Maize groats and meal	24,079	58,607	17,868	44,157
Maize flour	1,585	3,749	2,037	6,104
Pearl barley	3,533	12,421	2,331	14,078
White bean	331	2,806	287	2,042
Red bean	2,441	18,436	4,200	23,478
Mung bean	70,808	528,501	100,897	651,753
Black matpe bean	36,969	530,204	59,712	508,990
Black bean	2,795	21,255	2,073	11,984
Other dried leguminous	15,765	112,062	23,088	125,281
Vegetables				
Cassava shredded	65,604	117,424	255,617	408,539
Cassava flour	201,264	653,061	235,160	673,794
Cassava pellets	3,686,670	6,946,026	5,796,117	9,806,340
Cassava, waste	110	194	376	335
Tapioca and sago	717	3,502	694	2,802
Melon seeds	947	9,402	10,981	69,732
Sorghum	135,464	298,714	158,065	371,702
Vermicelli made from bean	194	6,846	409	12,963
Raw sugar	1,621,518	7,318,312	1,039,464	3,967,528
Refined sugar	33,092	126,781	585	2,768
Other sugar	1,295	13,276	2,068	14,310
Molasses	953,176	745,179	742,030	506,698

Table 4: (Continued 1)

Item	1977		1978	
	Quantity	Value	Quantity	Value
Oil Seeds				
Castor seed	68,568	516,436	36,925	281,127
Cotton seed	5,729	13,936	19,067	41,496
Kapok seed	8,339	25,138	3,258	10,155
Groundnut	13,945	147,083	20,371	192,384
Soy bean	11,505	82,559	8,098	51,295
Sesame seed	11,799	116,611	17,229	204,363
Lotus seed	1,232	26,846	1,900	43,925
Groundnut oil crude	596	10,392	134	2,187
refined or purified				
Palm oil crude refined	124	479	2,668	24,247
or purified				
Castor oil crude refined	11	210	1	20
or purified				
Soya bean oil crude	-	-	-	-
refined or purified				
Coconut oil crude refined	-	-	*	5
or purified				
Sesame oil crude refined	-	-	14	505
or purified				
Coconuts shelled or not	2,468	3,171	1,590	4,592
Fiber Crops				
Kenaf raw or processed	62,998	373,830	67,333	393,362
not spun				
Kenaf Tow raw or processed	1,383	2,386	3,023	10,047
not spun				
Kenaf Cuttings raw or	11,527	26,202	15,145	32,769
processed not spun				
Kenaf Waste raw or	3,548	5,460	3,603	7,218
processed not spun				
Cotton	2,505	37,883	4,944	99,941
Jute raw or processed	1,776	8,893	1,954	5,456
not spun				
Kapok fibre raw or	15,443	244,308	16,826	237,305
processed not spun				
Kapok	151	1,273	157	1,553
Coir fibre raw or processed	3,311	8,633	3,346	9,165
not spun				
Yarn of jute	15,123	146,106	29,091	290,170
Yarn of Coir fibre	-	-	50	233
Fabrics of jute	850	6,633	3,122	13,517

Table 4: (Continued 2)

Item	1977		1978	
	Quantity	Value	Quantity	Value
Garden crops and fruits				
Seeds for planting	1,291	9,568	916	8,395
Oranges	2,499	13,027	4,495	16,345
Mandarines tangerines	247	1,274	76	466
Pomeloos	1,933	9,940	2,130	12,784
Other citrus fruit fresh or dried	16	113	*	1
Lemons and Limes	14	84	49	669
Grapes fresh	2,202	24,897	1,911	20,123
Bananas fresh	16,633	22,240	19,170	30,085
Mangoes fresh	1,302	6,350	3,171	13,807
Water melons fresh	832	1,659	539	1,031
Longans fresh	3,076	39,461	1,971	34,891
Durians fresh	-	-	1,478	23,371
Papayas fresh	-	-	4,511	10,669
Rambutans fresh	-	-	304	1,761
Pineapples fresh	134	923	93	427
Sugar apples fresh	-	-	1,120	6,023
Cashew nuts not shelled	6	311	80	320
Cashew nuts shelled	21	833	*	20
Other fruit fresh	8,736	38,499	1,424	7,251
Fruit provisionally preserve for transportation	-	-	7	62
Pineapples dried	*	4	49	3,356
Bananas dried	58	433	12	431
Fruit frozen not added sugar	5,495	46,817	23,197	256,906
Other fruit dried	22	114	27	600
Pineapples in airtight containers	88,061	898,000	113,859	1,201,399
Rambutan in airtight containers	206	4,297	195	3,599
Longan in airtight containers	193	3,727	143	2,943
Rambutan with pineapples in airtight	314	6,436	296	13,395
Other fruit in airtight container	2,460	20,061	207	3,427
Vegetables prepared or preserved	6,427	49,711	8,412	68,660
Pineapple juice	2,409	19,402	4,540	44,294
Other fruit juice	87	939	21	259

Table 4: (Continued 3)

Item	1977		1978	
	Quantity	Value	Quantity	Value
Shallots dried	2,673	12,833	3,141	17,48
Onions dried	335	2,292	748	6,56
Garlic dried	15	179	211	1,74
Pepper black or white	268	9,438	84	2,45
Chilly dried	307	8,128	1,504	34,98
Other pimento	3	158	3	19
Other spices	341	4,964	580	17,21
Plant breeds	135	1,689	32	55
Betel leaves	760	5,748	2,544	19,68
Betelnut dried	2,125	6,595	2,938	18,65
Ginger grey and white	116	1,008	1,846	14,43
Gardamoms	149	3,543	178	5,51
Tamarind dried	17,222	38,259	18,095	41,84
Orchid Plant	82	2,401	111	3,66
Other live plants	15	358	31	85
Cut flowers and flower, buds fresh	7	266	3	9
Cut natural orchids	2,974	130,522	4,331	187,12
Fresh potatoes	11	83	1,553	5,40
Vegetables, fresh	10,758	35,176	16,957	40,09
chilled frozen				
Vegetables dried, dehydrate	433	13,269	8,412	68,66
evaporated				
Tea dust	22	265	1	5
Tea leaves	143	3,464	365	6,57
Instant tea	-	-	-	-
Coffee not roasted	1,053	73,861	1,364	57,91
Coffee roasted including	70	5,472	81	5,08
ground				
Instant coffee	*	16	*	1
Tobacco and Rubber				
Tobacco leaf	24,973	913,408	30,427	1,146,68
Tobacco scrap and stems	2,992	10,803	3,610	13,20
Other tobacco unmanu	15	284	773	1,20
factured				
Tobacco manufactured	*	35	1	7
Rubber				
Rubber smoked sheets	302,217	4,657,743	338,951	4,191,84
Black rubber	63,953	1,014,714	69,826	1,291,36

Table 4: (Continued 4)

Item	1977		1978	
	Quantity	Value	Quantity	Value
Rubber crepe sheets	31,401	431,936	31,478	513,679
Rubber blocks and cuttings	3,736	51,739	1,524	25,384
Other natural rubber	553	7,181	413	7,601
Inner tubes (unit)	41,732	1,206	311,752	6,460
Pneumatic tyre cases (unit)	219,725	28,318	287,302	53,228
Gloves of unhardened vulcanised rubber (pair)	3,960	17	48,000	294
Articles of unvulcanised rubber	4,026	78,431	4,699	108,522
Synthetic rubbers	2,036	11,032	1,827	15,344
Bullocks cows for breeding (Head)	-	-	-	-
Bullocks cows not for breeding (Head)	24,497	106,532	27,725	113,598
Buffaloes for breeding (Head)	90	592	-	-
Buffaloes not for breeding (Head)	17,306	108,090	22,798	137,782
Swines for breeding (Head)	639	710	-	-
Swines not for breeding (Head)	-	-	3,114	4,957
Fowls ducks for breeding (Head)	144,386	2,223	134,969	3,074
Fowls ducks not for breeding (Head)	665,746	4,277	1,598,930	11,809
birds	242,548	1,775	374,328	2,057
Other live animals	3,006,320	8,879	4,790,464	18,511
Animal Feeding				
Fish meal	75,617	534,719	111,878	727,153
Coconut cake	6,968	11,602	6,038	11,102
Groundnut cake	2,314	11,685	2,641	12,317
Beetpulp bagasse drags	4,494	6,852	2,253	3,735
Vegetable products use for animal food	5,512	10,175	2,757	7,217
Wheat bran	23,728	53,944	21,400	43,331
Soybean cake	-	-	-	-
Other bean cake	289	533	722	1,279
Cotton seed cake	5,344	14,218	11,061	28,292
Kapok seed cake	7,406	17,873	13,642	23,971
Other oil cake and residues	3,015	3,627	1,656	1,847
Sweetened forage	2,063	12,055	8,715	32,164
Livestock and poultry products				
Hides of buffalo fresh salted in brine	599	15,689	796	23,716
Hides of cattle fresh salted in brine	57	2,013	104	3,830

Table 4: (Continued 5)

Item	1977		1978	
	Quantity	Value	Quantity	Value
Hides of buffalo dried	88	2,502	63	1,8
Hides of cattle dried	16	492	38	1,4
Other bovine cattle leather (tawed) dyed designed	1,539	175,925	1,821	218,4
Meat of bovine animal fresh chilled frozen	1	19	2	
Meat of swine fresh chilled frozen	16	592	1,288	57,7
Edible offals fresh chilled frozen	149	5,000	1,104	40,0
Fowls duck fresh chilled frozen	4,254	157,515	9,287	333,7
Rice birds fresh chilled frozen	57	5,306	67	8,9
Other dead poultry fresh chilled frozen	*	47	7	7
Other meat fresh chilled frozen	8	80	20	4
Other meat, offals preparation	4	334	7	6
Feather, unworked	729	114,421	772	79,2
Bones, animals	23,868	121,921	25,511	122,7
Horn cattle	517	2,781	610	5,7
Lard	*	8	1	
Hatching eggs	-	-	-	-
Duck eggs fresh, dried or otherwise preserved	1,050	15,191	654	9,0
Hen eggs fresh, dried or otherwise preserved	3,610	59,537	1,815	28,1
Material from animal origin	3,464	24,645	6,016	51,5
Raw hides skins and leather of other animal	60	35,166	297	46,5
Fishery Products				
Fish fresh chilled frozen	40,220	236,460	48,187	317,8
Fish Live	608	8,977	557	23,1
Fish live for Aquarium	169	13,635	151	12,0
Cuttle fish fresh chilled frozen	25,739	664,336	34,011	1,022,0
Shrimps prawns lobsters, fresh, chilled, frozen	13,663	1,171,484	15,378	1,500,2
Fish, dried salted smoked other	1,915	44,033	3,594	42,8
Cuttle fish salted in brine dried	2,195	208,788	2,459	318,4

Table 4: (Continued 6)

Item	1977		1978	
	Quantity	Value	Quantity	Value
Shrimps prawns lobsters	1,440	81,973	1,607	121,327
salted in brine dried				
Other fishery by product	3,191	81,463	3,315	67,698
Other fish fresh	207	6,441	173	7,181
Textile Materials				
Cotton yarn and thread, grey	62	3,263	1,894	106,095
Cotton yarn and thread, others	312	26,942	641	65,428
Silk yarn and thread	-	-	3	201
Silk fabrics (1,000 yd ²)	272	30,040	292	33,789
Cotton fabrics, grey (1,000 yd ²)	2,776	7,219	57	10,751
Cotton fabrics, others (1,000 yd ²)	71,460	673,191	1,246	1,081,177
Gunny bags (1,000 unit)	23,503	164,792	54,972	425,062
Forestry Products				
Teak (cubic meters)	39,373	545,910	15,397	253,720
Yang (cubic meters)	2,532	7,371	215	470
Wood, other sorts (cubic meters)	8,971	73,244	3,963	46,787
Pra du (cubic meters)	31,319	163,418	13,891	39,847
Ma ka (cubic meters)	821	20,863	96	2,414
Bamboos	78	63	1	10
Rattans	425	633	244	705
Reeds	183	422	707	1,760
Other vegetable materials	263	420	395	4,068
use for plaiting and carving				
Vegetable materials use in brushes or brooms	204	1,136	234	948
Sea weed	2	870	20	3,975
Other vegetable products	537	1,203	390	4,166
Yang oil	48	990	103	2,691
Seedlac and Sticklac	7,354	56,180	7,912	58,727
Shellac	180	2,925	146	2,559
Gum damar	495	1,828	777	2,847
Gambier or catechu	20	315	26	357
Gamboge	1	116	3	549
Kobuak powder	8,381	43,334	8,209	48,768
Firewood	4	61	6	77
Wood charcoal	34,544	21,711	34,557	24,498
Hide, skin, born of wild animal	111	20,716	77	32,117
Other forestry by product	1,729	51,723	1,401	52,537

Table 5: Quantity and Value of Agricultural Import, 1977-1978.

Item	1977		1978	
	Quantity	Value	Quantity	Value
Imports				
Food crops				
Maize	93	2,278	81	1,2
Maize flour	493	3,604	504	3,5
Wheat	60,296	170,290	130,188	321,4
Wheat flour	10,423	53,618	15,244	76,4
Malt	15,375	139,779	17,450	114,6
Other cereals	352	3,693	703	4,9
Cereal preparations	4,987	205,152	4,960	130,4
Oil Seeds				
Coconut	2	73	*	1
Copra	2,102	17,020	3,441	30,5
Coconut oil	687	8,443	560	7,6
Garden Crops and Fruits				
Potato	33	170	26	5
Vegetable, fresh, and dried	966	60,306	914	30,2
Vegetable, prepared	116	2,499	60	1,8
Fruits, and nuts, fresh	3,300	62,809	990	18,3
Fruits, dried and prepared	803	23,729	450	13,7
Fruit juice	273	9,836	98	2,0
Sugar refined	*	3	*	
Molasses	*	7	3	
Other sugar and syrup	209	4,030	148	4,1
Miscellaneous Crop				
Pepper and Pimento	99	2,545	30	7
Chilli dried	784	16,388	206	4,7
Onions shallots dried	6,583	45,634	8,254	54,0
Garlic dried	4,418	37,669	568	6,9
Spices, other	504	9,729	605	14,1
Coffee	254	11,907	158	23,4
Tea	686	21,818	910	31,8
Seed for planting	516	31,262	680	44,6
Plant breed	1	92	2	2

Table 5: (Continued 1)

Item	1977		1978	
	Quantity	Value	Quantity	Value
Tobacco and Rubber				
Tobacco				
Leaf and Unmanufactured	11,399	895,651	8,644	730,226
Manufactured	32	6,631	105	25,583
Rubber				
Tyres and Tubers for vehicles	655	44,326	654	112,885
Hygienic, medical and surgical articles made of rubber	55	2,732	67	5,714
Manufactured, other	1,639	139,485	3,554	258,969
Animal Feeding				
Fish meal	1,931	10,580	1,256	7,895
Rice bran cake or meal	-	-	-	-
Groundnut cake	30,429	148,414	8,403	32,678
Soy bean cake	53,559	252,760	82,357	387,987
Other bean cake	9,026	43,743	517	4,502
Sweetened foreage	5,220	136,141	8,123	178,433
Livestock				
Bullocks and cows for breeding	3	298	607	23,934
Bullocks and cows	1,253	1,479	1,300	1,488
Buffaloes for breeding	-	-	-	-
Buffaloes	261	276	432	454
Swines for breeding	1,103	15,806	783	12,866
Swines	-	-	-	-
Fowls, ducks for breeding	777,278	28,059	910,103	40,615
Fowls, ducks	3,719	175	500	10
Livestock Products				
Other live animals	60,963	3,467	4,889	8,252
Meat, fresh and preparations	84	5,997	97	6,558
Oil and fat of animals	7,954	89,393	7,965	98,123
Hide, undressed	35	381	469	7,756
Leather	201	6,031	456	16,700
Milk and Cream				
Fresh (1)	-	-	7	339
Condensed and evaporated	1,866	18,141	121	2,046
Dried (2)	39,262	696,991	43,751	827,391

- (1) Milk and cream : fresh (including buttermilk, skim milk, sour milk, sour cream and whey)
- (2) Milk and cream (including buttermilk, skim milk and whey), dry (in solid form, such las blocks dan powder).

Table 5: (Continued 2)

Item	1977		1978	
	Quantity	Value	Quantity	Value
Cheese, butter and ghee	4,414	130,021	3,985	123,906
Milk food, other	1,140	36,698	1,393	20,379
Fishery Products				
Fish, live	153	8,616	254	22,538
Fish, fresh	326	8,074	1,296	22,142
Fish, salted and dried	70	1,804	21	1,146
Crustacea and molluses	9,850	13,707	20,349	38,108
Fish canned	1,498	21,177	667	13,504
Fish products	57	717	33	4,959
Textile Materials				
Cotton yarn and	*	61	24	1,639
Thread, grey				
Cotton yarn and	22	4,644	16	2,387
Thread, others				
Silk yarn and thread	110	47,972	107	56,257
Cotton fabrics, grey	*	9	-	-
Cotton fabrics, other	14,423	210,056	16,156	344,254
Cotton raw & linters	91,494	2,884,185	70,516	2,031,740
Cotton fabric, remnants	94	6,035	81	4,271
Silk fabrics	3	141	3	155
Woollen fabrics	212	6,209	154	4,812
Linen, hemp, ramie and	10	515	1	39
jute fabrics				
Synthetic fibers fabrics (1)	30,651	255,863	40,762	454,623
Ropers (2)	1,501	46,765	1,147	33,147
Gunny bags	30,000	166	8,348	727

(1) Fabrics of synthetic fibers, spun glass and Textile fibers mixed with metal

(2) Corpage, cables ropes, twine and manufactures. (fishing nets, ropemakers wates)

Table 5: (Continued 3)

Item	1977		1978	
	Quantity	Value	Quantity	Value
Paper products				
News print	74,201	432,429	90,131	545,508
Printing and writing paper	4,868	88,382	5,345	100,973
Kraft paper	4,043	33,814	3,988	37,046
Cardboard corrugated	1,383	29,738	1,727	28,470
Fertilizer, Fungicide and Insecticide				
Fertilizer				
Nitrogen	212,109	336,938	229,329	501,343
Phosphats	16,308	39,249	4,670	12,736
Potass	6,930	16,061	22,752	41,261
Others	635,290	1,693,638	494,703	1,468,626
Fungicide and insecticide(1)	15,570	661,446	20,318	897,716
Machinery and Appliances for Agricultural purpose				
Ploughs	2,260	4,614	824	5,588
Harrows	2,558	7,358	988	6,505
Cultivators	45	571	42	498
Distributors	638	551	144	2,548
Harvesting machine	72	2,197	6	1,654
Grafs Mowers	6,226	7,202	6,631	9,804
Threshing machine	49	394	480	78
Cleaning mach	485	3,123	162	3,652
Paultry incuba for breeders	123	14,194	68	23,426
Other	8,246	10,530	1,140	5,372

(1) Insecticides, fungicides, disinfectants, weed-killers, anti-sprouting products, rat poisons, animal dressings, Naphthalene balls, and Moth balls.

Source: Thailand: Office of Agricultural Economics.

Table 6: Gross Domestic Product

Sector	Gross Domestic Product: 1,000 million ba	
	1970	1977
Agriculture	38.5	105.4
Manufacturing	21.8	71.3
Wholesale and retail trade	25.9	63.6
Other	49.9	131.1
Total	136.1	370.4

Source: National Income of Thailand, 1977.

Table 7: Income per Worker by Main Occupations in 1976.

Occupation (by sectors)	Annual Income of Worker (in baht)
Agriculture	7,113
Industry	44,215
Commerce	70,339
Services	32,665

Source: The Fourth National Economic and Social Development Plan (1977-1981)

The majority of agricultural products of Thailand was export mostly in raw material form either for consumptions or for processing overseas. Some of the agro-industrial items being export are flour made from white rice, glutinous rice, maize and cassava, vermicelli made from rice and bean, oil produced from palm, groundnut and castor, cassava-shredded, cassava pellets, raw and refined sugar, molasses, dried fruits, canned fruits, and canned juice.

Agro-industrial development during the last few years has been quite rapid. The board of investment has some interesting reports as follows:

1. Types and number of firms granted promotion-certificates in the year 1960-1970:

1.1	Large-scale cultivation	16 firms
1.2	Processing of Agricultural Products	37 firms
1.3	Processing or preservation of food	49 firms
1.4	Animal feed	39 firms
1.5	Oil production from agricultural products	19 firms
1.6	Corn products	4 firms
1.7	Rubber products	21 firms
1.8	Livestock raising or meat processing	10 firms
1.9	Animal products	8 firms
1.10	Cultivation of Mulberry trees and silkworm farming	4 firms

1.11 Silk reeling	4 firms
1.12 Deep-Sea fishing and off-shore fishing	17 firms
1.13 Slaughtering and Disemboweling of chicken for export	2 firms
1.14 Manufacture of Products Made from Rattan & Bamboo for export	6 firms

2. In 1980, 27 firms were granted promotion - certificate for the production of canned food, animal feed, deep-sea fishing, dried fish and cashew nut.

3. There has been a great promotion in new agro-industrial projects especially fishery product, fresh fruits for export, seed production & expansion and vermicelli from bean.

4. Factories newly operated in 1980 are for the production of baby food, production of food for fish and shrimp and animal feed production.

The above informations indicated that the structure for the agro-industry in Thailand is mostly food industry, beverage and tobacco. Large factories concerned are for example, rice milling, slaughter-house, cane sugar factories, dairy products factories, canned food factories and many other kinds of factory including beverage and products from tobacco. In 1977 these agro-industrial products accounted for 39.2 per cent in value of all manufacturing sector. These 39.2 per cent were from food

industry 18.5 per cent (8,700 million baht), beverage 12.0 per cent (5,667 million) and tobacco 8.7 per cent (4,084 million baht).

Thailand also received many technical assistance from various aid-giving sources for the subject of agricultural development and the agro-industry. Some sources of assistance and aid-areas are:

1. Governmental organizations:

1.1 United States of America - the main areas of concentration were on agriculture.

1.2 U.N. - UNDP important new projects were Rainfed Crop Production Research and Development and Agricultural Machinery Production.

1.3 Colombo: United Kingdom, Canada, Australia, New Zealand, India, Pakistan and Sri Lanka. Japan continued to be the largest contributor while Australia, United Kingdom and New Zealand are still being major aid-giving countries. The assistance received concentrated on activities in the field of agriculture, communication, community and social development. Some important projects launched in 1980 were the Promotion of Food Production in Thailand, fertilizer, and agricultural chemicals.

1.4 Third countries group - The assistance from this group placed emphasis on agriculture. The education and so-

cial development worth 2.1 million U.S. dollars of the total was granted in the form of assistance. The grant was utilized through the Department of Agricultural Extension and the Marketing Organization for Farmers.

One significant donor is the European Economic Community (EEC) which contributed financial assistance valued at 23.1 million U.S. dollars to projects leading to rural community development.

Other donors are France, Netherlands, Denmark, Austria, Israel, Italy, Belgium, Egypt, Switzerland, Norway, Sweden, the People's Republic of China, Yugoslavia and Finland.

2. Non-governmental organizations and private foundations:

- 2.1 The Rockefeller Foundation
- 2.2 The Ford Foundation
- 2.3 The Asia Foundation
- 2.4 The International Research Centre (IDRC)
- 2.5 The Asian Productivity Organization (APO)
- 2.6 The International Rice Research Institute (IRRI)
- 2.7 The South East Asian Ministers of Education
Organization (SEAMEO)
- 2.8 The Centre for Tropical and Biology (BIOTRO)/
Indonesia

3. Assistance from Overseas Volunteer Programmes:

The emphasis of these volunteer programmes is placed on agriculture, water resources, cooperations, and social and community development. Volunteer services are from the followings:

3.1 Volunteer Service Overseas (VSO) of the United Kingdom

3.2 The U.S. Peace Corp (PC)

3.3 The German Volunteer Service (GVS)

3.4 The Canadian University Service Overseas (CUSO)

3.5 The New Zealand Volunteer Service (VSA)

Besides volunteer services, the advisory services are also received from the overseas executives of

The Inter-Executive Services Corps (IESC)

The Canadian Executive Service Overseas (CESCO)

The British Executive Service Overseas (BESO)

Volunteer Development (VDC)

4. Private sector:

World Bank has approved loan to Thailand to help finance National Agricultural Research Project. Major emphasis of the project is on upland crops and farming systems for rainfed agriculture to benefit the country's poorest farmers.

World Bank also approved loan to Kasetsart University to expand the campus to the new site at ~~Kamphaeng~~ ^{Kamphaeng}seen.

THE GOVERNMENT'S POLICY

1. National Development Targets and Strategies.

Some of the national targets for economic and social development of the country during 1977-1981 can be summarized as follows:

1.1 Production targets:

To obtain the gross domestic product (GDP) at an average annual growth rate of 7 per cent, the government has to concentrate upon certain key production sectors as shown in Table 8 and 9 Table 9 in order to achieve the following targets:

1.1.1 Agricultural Production: The target for output expansion rate is at 5 per cent per annum. The expansion of cultivated land is kept at a rate of not less than 500,000 rai per annum and the strategy for agricultural development is emphasized on structural improvement within the agricultural sector due to land limitation. Firstly, the production is increased through crop intensification. Major economic crops in which intensified production can be undertaken include dry season paddy, maize, bean, sorghum, sugar cane, kenaf, tobacco, cotton and rubber. Secondly, further agricultural diversification is promoted, particularly in the livestock and coastal fishing sub-sectors. Programmes for increasing the production of vegetables and fruits are also set up.

1.1.2 Industrial Production: The target for manufacturing output expansion is set at a rate of 9.6 per cent. The output of export industries such as sugar, textile and cement is increased

in accordance with demand in world markets. The emphasis is placed on the development of agro-industries such as paper, food canning and livestock feeding which can stimulate agricultural production by creating additional demand and can provide additional rural employment. The small-scale import substitution industries which utilize indigenous raw materials and labour is expanded to meet domestic demand.

1.2 International Trade Targets: The industrial value is projected to increase at a minimum rate of 9.6 per cent per annum. In order to achieve this target growth rate, output expansion for the substitution of the import industries, agro-industries, and labour; intensive small scale industries in particular have to be accelerated.

To attain the GDP growth rate target of 7 per cent per annum the following export and import targets are aimed:

1.2.1 Export targets - The targets for increasing the export volume of major agricultural, industrial and mineral are shown in Table 10.

Table 8

Production Targets Classified by Sector
(At constant prices)

Sector	Third Plan Period				Fourth Plan Targets			
	1971		1976		1981		1977-81	
	Value (million baht)	%GDP	Value (million baht)	%GDP	Average Annual Increase	Value (million baht)	%GDP	Average Annual Increase
1. Agriculture	38,145	29.4	46,113	26.4	3.9	58,706	23.9	5.0
2. Industry	23,569	18.2	35,575	20.3	8.6	56,277	22.9	9.6
3. Mining & Quarrying	1,879	1.4	1,762	1.0	-0.5	2,066	0.8	3.2
4. Construction	6,210	4.8	6,951	4.0	2.4	8,059	3.3	3.0
5. Electricity & Water Supply	2,934	2.3	5,737	3.3	14.4	9,794	4.0	11.3
6. Transport & Communication	7,981	6.2	11,780	6.7	8.1	16,857	6.9	7.4
7. Wholesale and Retail Trade	22,816	17.6	28,792	16.5	4.8	39,080	15.9	6.3
8. Banking, Insurance and Real Estate	5,297	4.1	8,852	5.1	10.9	13,063	5.3	8.1
9. Ownership of Dwellings	2,399	1.9	2,861	1.6	3.6	3,555	1.4	4.4
10. Public Administration and Defence	5,647	4.3	7,546	4.3	6.0	10,331	4.2	6.5
11. Services	12,740	9.8	18,897	10.8	8.2	27,470	11.2	7.8
Total Non-agricultural Sectors	91,472	70.6	128,753	73.6	7.1	186,552	76.1	7.7
Total Agricultural Sector	38,145	29.4	46,113	26.4	3.9	58,706	23.9	5.0
Gross Domestic Product	129,617	100.0	174,866	100.0	6.2	245,258	100.0	7.0

Source: Thailand: The Fourth National Economic and Social Development Plan (1977-1981)

Table 9 Major Production Targets

	1977	1978	1979	1980	1981	Annual Average Increase
(a) Agriculture						
- Crops						
Rice (million ton)	15.4	15.6	15.9	16.2	16.5	2.0
Sugar Cane (million ton)	21.9	23.6	25.3	26.9	28.6	7.0
Maize (million ton)	3.5	3.6	3.6	3.7	3.8	9.0
Tapioca (million ton)	9.8	10.0	10.3	10.5	10.8	3.0
Rubber (Thousand ton)	407	421	436	450	466	3.0
Jute (Thousand ton)	220	220	220	220	220	3.0
Virginia tobacco (Thousand ton)	44.7	49.2	54.1	59.5	65.5	9.0
Mung Bean (Thousand ton)	292.5	306.0	333.2	353.2	390.4	8.0
Soy Bean (Thousand ton)	310.0	327.6	351.1	387.7	431.2	8.0
Cotton (Thousand ton)	63.0	76.0	115.5	149.5	205.0	28.0
- Livestock (at constant prices, million baht)	6,913	7,539	8,212	8,932	9,709	8.0
- Fisheries (at constant prices, million baht)	4,769	4,927	5,092	5,274	5,464	3.4
- Forestry (at constant prices million baht)	2,951	2,991	3,028	3,064	3,098	1.3
(b) Industry						
Sugar (Thousand ton)	1,622	1,742	1,863	1,983	2,103	5.6
Cement (Thousand ton)	4,533	4,850	5,190	5,553	5,942	7.0
Textiles (million square yard)	1,115	1,203	1,291	1,378	1,525	10.4
Iron and Steel (Thousand ton)	482	535	592	652	714	10.5
Paper and Pulp (Thousand ton)	297	363	429	495	563	19.5
Fruits and Canned Vegetables (Thousand ton)	53	61	68	76	84	12.8
Animal Feed (Thousand ton)	1,177	1,530	1,989	2,586	3,362	30.0
Condensed Milk (Thousand ton)	106	111	117	124	131	5.4

Table 9 (Continued)

	1977	1978	1979	1980	1981	Annual Average Increase
(c) Mining						
Tin (ton)	29,100	30,100	31,100	32,100	33,100	3.2
Manganese (ton)	32,050	33,690	33,330	33,970	34,610	2.3
Fluorite (ton)	285	282	280	280	280	-0.6
Antimony (ton)	9,000	9,400	9,900	10,500	11,000	5.9
Tungsten (ton)	4,100	4,600	5,100	5,600	6,100	11.2
Barite (thousand ton)	269	308	346	385	431	13.4

Source: Thailand: The Fourth National
Economic and Social Development Plan
(1977 - 1981)

Table 10 Major Production Targets

	Unit	1976	1977	1981
Agriculture				
1. Crops				
1.1 Paddy	million tons	14.7	15.4	16.5
Wet Season	"	13.4	14.0	14.6
Dry Season	"	1.3	1.4	1.9
1.2 Rubber	Thousand tons	394.0	407.0	466.0
1.3 Sugarcane	million tons	20.3	21.9	28.6
1.4 Maize	"	2.5	3.5	3.8
1.5 Mungbean	Thousand tons	255.9	292.5	390.4
1.6 Cassava	million tons	9.2	9.8	10.8
1.7 Tobacco	Thousand tons	37.0	44.7	65.5
1.8 Cotton	"	60.7	63.0	205.0
1.9 Soybean	"	290.0	310.0	431.2
1.10 Kenaf	"	190.0	220.0	220.0
2. Livestock				
2.1 Cattle	Thousand heads	770	820	1,080
2.2 Water Buffaloes	"	334	336	415

Table 11 Annual Increase in Production of Major Agricultural Commodities

(at constant 1962 prices)

	1972-76	Target 1977-81
1. Crops		
1.1 Rice	4.3	4.6
1.2 Rubber	1.0	2.3
1.3 Sugar Cane	3.7	3.4
1.4 Maize	27.6	7.2
1.5 Mung Bean	14.2	9.8
1.6 Tapioca	2.4	8.9
1.7 Tobacco (Virginia)	15.8	3.2
1.8 Cotton	16.1	9.9
1.9 Soy Bean	6.4	28.6
1.10 Kenaf	15.6	8.3
1.11 Vegetables and Fruits	-9.3	3.3
1.12 Others	5.8	6.2
2. Livestocks	3.6	4.5
2.1 Cattle and Buffaloes	7.1	8.9
2.2 Others	1.4	6.2
3. Fisheries	8.8	9.4
3.1 Fresh Water Fishing	0.3	3.4
3.2 Off-Shore Fishing	9.6	6.0
4. Forestry	-1.8	2.5
	1.3	1.3
Total	3.9	5.0

Source: Thailand: The Fourth National Economic and Social Development Plan.

Table 12 Exports Volume Targets

Exports Item	Targets of Annual Export Increase (%)
Agricultural Products	
- With large export volume e.g. rice, maize, rubber and tapioca products	3.4%
- With promising external markets e.g. tobacco, shrimp, squid, mung beans and fresh fruits.....	14.4%
- Other exports with potential market e.g. sorghum, beans, castor beans, lac and cattle.....	8.4%
Industrial Products	
- Products manufactured for export e.g. canned pine-apple, electronical equipments, garment, furniture parts and gloves.....	16.0%
- Products with export potential e.g. sugar, cement, cotton yarn, cotton cloth and fibre, canned fruits and vegetable sanitation equipments.....	8.9%
- Products of cottage industries e.g. wood carving, Thai silk, gems.....	10.9%
Mineral Products	
e.g. tin, fluorite, barite, wolfram, manganese, antimony.....	4.5%

Source: Thailand: The Fourth National Economic and Social Development Plan (1977-1981)

The highest rate of export expansion is envisaged for tobacco, shrimp, squid, mungbean and fresh vegetables. The government also gives support to other products in which a market exists, such as sorghum, bean and cattle, to induce further expansion into such markets. Changes in export structure through diversification into new products in order to add up the export earning.

1.2.2 Import targets - The increasing rate of 11.5 per cent per annum of input is essential for the maintenance of national economic stability. Major import items are consumer goods; raw materials for the production of consumer goods, capital goods, and raw materials for the production of capital goods, fuel and lubricants.

2. Some New Integrated Development Strategies

2.1 To accelerate agricultural output expansion at a minimum rate of 5 per cent annually

2.2 To promote export industries, agro-industries as well as industries utilizing indigeneous natural resources which will create income and employment for the majority of the people.

2.3 To develop Science and Technology:

Potential in the field of science and technology is mobilized to support the achievement of the Fourth Plan targets on increasing productivity exports and production diversification. Various government agencies involving in science and technology are strengthened to promote new scientific and technological inputs which are appropriately useful and applicable to the national economic, social and environmental conditions. Priority is given to the adoption of appropriate technology to agriculture and industry for the benefit of the public.

3. Rural Productivity Improvement and Diversification

3.1 Strategies for increasing the level of Agricultural Income and Output. In order to raise agricultural production and income, the following strategies for the formulation of public programmes are laid down in the Fourth Plan:

3.1.1 Production diversification: To aim at generating new employment opportunities for the agricultural labour force and also to alleviate risk of income fluctuations which would result from over dependence on a single crop.

3.1.2 Productivity Improvement: Irrigation facilities are expanded to serve the need for increasing agricultural production. The improvement of soil quality is also emphasized. In addition, agricultural extension is strengthened to disseminate new research findings available in the Government demonstration plots to farmers.

3.1.3 Agricultural Prices: Raising prices of agricultural output at the farm level is a pre-requisite for improving farmer's incomes in the short run. Farmers organizations and cooperatives are promoted to assist farmers on the marketing side and on long term price stabilization.

3.2 Agricultural Diversification:

3.2.1 Background - During the Third Plan period, the structure of agricultural production is dominated by six major crops, that is, rice, maize, sugar cane, tapioca, rubber, and

kenaf. The total area under these crops accounted for 52 per cent of the total value of agricultural output. As for export value, these crops account for 88 per cent of total agricultural exports. During the Fourth Plan further diversification is encouraged so that farmers will not have to rely too much on any particular crops. The expansion of certain crops such as oil seeds, oil palm, fruits and vegetables, and other crops which are required by domestic agro-industrial plants and with good market potential is quite necessary.

This agricultural diversification is necessary to generate more employment opportunities and to reduce risks from depending on a few crops

3.2.2 Policies - The main policies for agricultural diversification including, firstly, the undertake of agricultural diversifications through more intensive use of land and under employed labour, secondly, the encouragement of diversification of crop production away from the six major crops.

3.3 Development Strategies and Measures:

3.3.1 Diversification Through Better Utilization of Existing Resources. The strategy involves the promotion of intensive agriculture and mixed farming in which production can be undertaken on a year-round basis. Some of the specific measures have also been designed for each agricultural sector:

(1) Livestock. The most important farm animals at present are cattle, water buffaloes, swine and poultry. Livestock raising for selling in foreign markets and for domestic consumption is encouraged.

(2) Fisheries. To develop brackish water fishery by the promotion of aquaculture in coastal areas. Fish processing industries are also encouraged. More emphasis is placed on the conservation of marine life and the rehabilitation of water resources. The provision of education and training on deep sea fishing are also necessary to raise the living standard of fisherman.

(3) Vegetables and Fruits. The government encouraged the cultivation of vegetables and fruits which can be used as inputs for agro-industrial plants. Major projects include the improvement in the quality of vegetable seeds and the introduction of methods to ensure higher quality products

3.4 Agricultural Productivity:

To increase productivity, the Government has moved to use greater amounts of basic resources in agriculture such as land, water and labour. The extension of research findings of Government research and experiment stations to as many farmers as possible are also promoted.

4. Industrial Development.

The Government has set up many measures to promote

industrialization concurrently with agricultural development and give priority to basic industries, supporting industries and agro-industries. Other high priority are large scale industries utilizing natural resources, the establishment of agro-processing industries near the main sources of raw material, the development of small scale industries, the import-substitution industries, and the promotion of export - oriented industrial production.

CONCISE INFORMATION ABOUT IFRPD

General

Date of Foundation : July 8, 1968.

Postal Address : Institute of Food Research and Product
Development (IFRPD)
Kasetsart University
P.O. Box 4-170, Bangkok 4, Thailand

Telephone : 5790572; 5790592.

Type : A government institution attached to
Kasetsart University,
Office of University Affairs.

Background

The Institute of Food Research and Product Development (IFRPD) is a research & Development unit in food production of Kasetsart University, the first university in Thailand to offer degree programs in agricultural sciences. The Institute was established in 1955 as a division of The Preserved Food Organization under The Ministry of Defense. It was later on transferred to Kasetsart University in 1967.

The Institute of Food Research and Product Development has at present pilot plants of 2,800 square meters which include lines for milling and baking, processing of fruits and vegetables and fermentation industries; laboratories of 1,200 square meters, and stores and workshops of 1,400 square meters. Future expansion

of the institute to the new site covering 17,000 square meters, which is at the Kamphaengsaen campus, is underway. At the Kamphaengsaen site, there will be development and training. The Training Centre for national and international training associated with the United Nations University and with the South East Asia Agricultural Education Development Association (SAEDA). The Institute has a staff of 45 scientists, 2 engineers, 13 technicians and 21 supporting personnels. The permanent employees of 95, and temporary employees of 31 are also employed.

The Library and Documentation Unit of the Institute includes about 2,500 books and 80 journals and periodicals mostly in English. A Food Journal is published by IFRPD every 3 months as well as 60 Research and Feasibility studies Reports, monographs and review papers.

The Institute policies are governed by an Advisory Committee which consists of representatives of relevant colleges and departments. It comprises seven divisions including Research, Product Development, Quality Control, Pilot Plant, Engineering, Demonstration and Education, and Administration. There are also two outposted stations at Chiang Rai and Chiang Mai. The two stations conduct research on processing of oilseeds and fruits and vegetables respectively.

Objectives

The three primary objectives of The Institute of Food Research and Product Development are:

1. To implement the educational curricula in food technology and its related field and to render technological services to the society and also to promote the application of desirable research findings among members of the various occupational groups of the country.

2. To conduct research work for the benefit of Thai people, and

3. To assist in the promotion of industrial uses of available agricultural products.

IFRPD has cooperation with the relevant departments in national universities in the academic training of students and short courses at medium levels and industrial workers. It has also association with international and regional organizations in research programmes. The main areas of research had been in the development of nutritional foods, fermented foods and utilization of processing wastes. In collaboration with various international agencies, the various products have been developed for implementation in local food plants.

To reach the above objectives, the Institute has carried out her works in three main areas:

1. Area of Research and Product Development:-

- 1.1. To assist in solving the problems of malnutrition by carrying out research and development of products which are of high nutritive value, low cost and follow the local food pattern.

- 1.2. To conduct research work on the utilization and limitation of agricultural wastes.
 - 1.3. To utilize by-product, from agriculture and manufacture as foods.
 - 1.4. To develop new food products through the utilization of microorganisms.
 - 1.5. To find new or better processing methods for agro-industries.
 - 1.6. To produce agro-industrial products in order to meet the consumer acceptability.
 - 1.7. To evaluate the quality of raw materials and its finished products by chemical, microbiological, and biological means.
2. Area of Technology Transfer:
- 2.1. To introduce and to promote the production of low cost high nutritive food products.
 - 2.2. To introduce and to promote food products from agricultural by-products, and industrial by-products.
 - 2.3. To introduce and transfer technology to food industries especially in the areas of processing technique, handling, transportation, storage, and also food plant sanitation.
 - 2.4. To introduce and distribute processed food to both local and overseas.

2.5. To cooperate with other agencies inside and outside the country for the technology transfer.

3. Area of Education and Training

3.1. To cooperate with all agencies to teach and to train especially at the university level.

3.2. To cooperate with all agencies in offering special training courses for the public.

Responsibilities of some divisions of IFRPD

1. Research Division: This division is responsible for research work in the area of Food Science and Technology. The experimental projects are set up to utilize agricultural products to serve the fast growing agro-industries. Food research, food quality control, food product development and also food preservation experiments are under the responsibility of this division. The utilization of agricultural products in terms of high protein low cost food and the utilization of microorganisms in food production are also investigated under this division metabolic and safety evaluation of the new food products are also performed.

In order to serve the agro-industries in Thailand, it is of great advantages to learn of the quality of such raw materials in terms of chemical composition and their physical properties. This knowledge will ensure the good uniformity and quality of the materials entering the factories and thus prevent the loss of materials and finished products of good quality will be obtained. IFRPD has chemical, microbiological, and biological

assay laboratories under the responsibility of research division to carry out all tests necessary for the production of good quality food products.

2. Product Development Division: To improve or to develop new techniques of food processing suitable for agro-industries. The work in this section includes the development of food products from plants, cereals, oilseeds, fruits and vegetables, from animals, meat, pork, poultry, dairy and dairy products, and egg and egg products. The development of food and feed from agricultural or industrial by-products is also the important task of this division.

3. Quality Control Division: This division takes responsibility on the quality from raw materials to the finished products. The tests are carried out for the benefit of the consumers as well as the industries. The collection and to set up specification of food standard are also in this division.

4. Pilot Plants: All products which are ready to be promoted into industrial scale will be produced in pilot plant scale. The feasibility study for the acceptability of such products is then carried out before introducing of goods to the industry.

5. Engineering Division: The engineering division is divided into 6 sections as follows:

5.1 Mechanical section I. is responsible for the maintenance, repairing, installation and designing the equipments and machines in Pilot Plant 1, 2, and 3.

- 5.2. Mechanical section II. is responsible for the maintenance, repairing, installation and designing the equipments and machines in Pilot Plant 4, the biological testing house, and the Algae laboratory.
- 5.3. Electrical section which has the responsibility to look after all electrical devices including equipments and machines in the IFRPD. Electricians also have duties to install the switch boards and electrical lines for new machines.
- 5.4. Automobile section which takes the responsibility for the taking cares of cars, vans and trucks in the Institute. Mobile units are used to assist in examination of food quality in requested private industrial plants. Cars and vans are provided for officers-in-charge and overseas visitors.
- 5.5. Civil section is responsible for the maintenance of all buildings and roadworks.
- 5.6. Audio-visual section is responsible for the production and collection of slides and photographs. The preparation of the conference rooms, for instance, decoration, sound, and lighting systems are to be arranged by this section.

6. Demonstration and Education Division: This division act as an information center to assemble and dissemble the informations by introducing and demonstrating new techniques or new products for the new food industry in Thailand and also for other regional developing countries under USAID, ASEAN, ASCA and other international programs. To perform this function the division is available with Mobile Kitchen Car. The division also organizes the seminars inside the country and also international seminars in co-operation with the international agencies. Some of the seminars and specified courses under the supervising of this division are as follows:

1) Protein Food Promotion Seminar:

This seminar was held at the Institute from Nov. 22 to Dec. 1, 1970. It was sponsored by the Institute, the Health Department and USOM(USAID). The proceedings, published in 2 parts, included a complete record of the seminar with over 40 papers contributed by outstanding scientists from Thailand and overseas including the USA, Japan, Republic of China, Australia, the Netherlands, India, Germany, Sweden and FAO.

2) Food Quality Control Course:

A short term course was arranged at the Institute in collaboration with Canada Plus-one and the Canadian International Development Agency from March 13 to April 7, 1972. It was attended by 3 representatives from Korea, 4 from Malaysia, and 21 from Thailand including representatives from the Quartermaster Department, P.F.O.,

Bangkok Sanitation Division, Ministry of Public Health, Department of Medical Science, Department of Science, and Private industry.

3) Quality Control Course:

This course for factory personnel has been held twice a year since 1970, with up to 30 factory foremen and other producer personnels in each course. They spend a month at the Institute studying sanitation, canning, packaging, management and food laws relating to food additives, etc.

4) Summer Course:

This one month course is for housewives and others engaged in cottage industries. It covers methods of producing various foods such as biscuits (cookies), cakes, bottled and canned foods such as fruit juice, jam, fruit in syrup, pickles and meat products such as curries.

5) University Students:

Some staff members give lectures in special subjects to the Food Science undergraduates Chulalongkorn and Kasetsart Universities. These students use the facilities provided by the Institute for their practical works in association with their lectures or special projects which are part of the course.

Some staff members act as advisors for Masterate thesis at Kasetsart University. Some post-graduate students also receive assistance or use the facilities at the Institute.

6) Graduate Students from Overseas:

Dr. Alvin Siegel spent 18 months at the Institute in 1972-1973 in order to do his research work for his doctorate degree from Kansas State University. The title of his thesis was "Development, Acceptability, and Nutritional Evaluation of new High-Protein Rice-based food for Thai Children".

Miss Pailin Thammaraks, M.Sc. student from Reading University, U.K. studied for 2 months at the Institute in 1974. She prepared a dissertation on the acceptability of "Kaset Baby Food".

Mr. Bekha Ram Shrestha from Nepal received 3 months training in 1971 as a food inspector. This was part of Thailand's contribution under the Colombo Plan Aid Programme.

Twelve nutrition extension officers from Laos took part in a special training course in 1973.

Mr. H.W.S. Samarawickrama, from Central Agricultural Research Institute, Sri Lanka, was trained at IFRPD for the period of 6 weeks in 1979 on Protein Food Supplement from Soybean under the sponsor from INTSOY.

Mr. H.G. Jayatissa, engineering foreman from Central Agricultural Research Institute, Sri Lanka, was trained at the Institute for 2 months in 1980 under the sponsor from the International Soybean Program (INTSOY). The training was mostly involved in the development of high nutrition foods from soybeans by using extrusion technology

7) Demonstration:

Demonstrations and lectures are given in domestic Science, nutrition, cooking, canning and the use of new products developed at the Institute, such as Kaset Protein. The grouped of visitors who take part in these demonstrations include housewives, teachers, college students, nurses, and people concerned with institutional feeding at Social Welfare Courses, etc.

Research Projects of IFRPD (see appendix B for details)

1. Protein Food Development and Implementation Projects:

The Institute has developed and produced high protein low cost foods for Department of Health under the National Food and Nutrition Plan by using the equipments obtaining from the United States Operations Mission(USOM). Scholarships were also granted for IFRPD personnels for studying, training, and joining the study tour under the funding of the same agency.

2. Algae Project (The Production and Utilization of Algae as a Protein Source in Thailand.

The Institute handled quite a number of aspects in Algae project, the joint project between Thai and German Government, which was conducted from 1970-1978. The German experts were assigned to stay temporarily in Thailand so as to give consultation concerning the project. Besides, the assistance in the forms of equipment for being used both in and out of the laboratory, chemicals, cars, and scholarships for studying abroad were given as well. Recently in 1980, the Institute has provided training in this aspect for an undergraduate

student from Germany for the duration of 2 months.

3. Asean Project:

The Institute of Food Research and Product Development has cooperated with the Association of South East Asean Nations (ASEAN) in organizing the Protein Project. The project has been administered by the ASEAN Sub-Committee on Protein of which the Director of the Institute plays an important role as the Chairman. The member countries have to support each other by means of giving required assistance, exchanging knowledges in various aspects, for instance, research and technology in Protein food production. Besides, exchanging the researchers and the scientific document is another mean of assisting each other among the members. Some of the researchers of the IFRPD were sent to the Philippines and Malaysia to advise their personnels on how to operate Cooker-Extruder. Not only this but also the conferences and seminars have been currently and curricularly held in the member countries for several times in order to create the exchange of new knowledges, ideas, and experiences among the researchers./

This project emerged in 1974 by having the Australian government as the supporting agency under the ASEAN-Australian Economic Cooperation Program. Fundings provided for Thailand during the first and subsequent three years durations, 1974-1977 and 1978-1981, were 534,305 and 519,790 Australian dollars respectively. The projects in progress are as follows:

3.1. The Protein Project and Master's degree training course in Community Health(MCH).

3.2 Utilization of Food Waste Materials Project

3.3 Food Technology Research and Development Project.

4. Baby Food Project:

The Baby Food Project with the assistance of the Australian Government under the Colombo Plan was set up in 1973. It is the long term experimental project conducted till 1976 by making use of the equipment obtaining from Australian Government and the assisting of 2 Australian experts.

5. Project the Acceptability Testing of Fish Protein Concentrate-Type B and Roller Dried Fish.

The project is financially supported for U.S.\$ 1,800 by the Food and Agriculture Organization of the United Nations. Aims of the project are to improve trashfish utilization and alleviate protein deficiency among low income population. The fish protein concentrate-type B and roller dried fish manufactured in Denmark and Norway were provided through the FAO and the acceptability tests were carried out in 1980. Funds are also granted to an IFRPD food engineer for one month training course in Denmark in the technology of producing high quality fish products.

Cooperation with Other Agencies in Thailand (see appendix A for details)

1. Ministry of Agriculture and Cooperative.

1.1. Assistance to the Food and Drug Division, Ministry of Health in controlling production standards and labelling requirements in Preserved Food factories.

1.2. Collaboration with the Nutrition Division in a joint Protein Food Promotion Project.

1.3. Collaboration with the Agricultural Promotion Department for the promotion of agricultural products as raw materials to produce high-protein low cost food.

2. Ministry of Industry.

2.1. Collaboration with Department of Science in defining Food Standards.

3. Ministry of Education.

3.1. Collaboration with the Ministry of Agriculture and Ministry of Health in arranging the Lunch Programme in schools.

4. National Food and Nutrition Committee.

4.1. Collaborate with the National Food and Nutrition Committee to promote the status of food and nutrition to solve the problem of malnutrition according to the Fourth National Economic and Social Development Plan.

5. Other Non-Governmental Sectors.

5.1. Collaboration with the Thai Food Processors Association in solving problems in packaging and processing.

5.2. Collaboration with Lever Brothers (Thailand) Ltd. in producing new products.

Some Facilities of the IFRPD

1. Laboratories and Pilot Plant.

1.1. Chemical Laboratory: Chemical Laboratory is a central laboratory for research and product development experiments as well as for chemical analyses of products. Up to 1980, there are more than 40 research projects accomplished. The Institute has authority to issue quality certificates of commercial food products for export. At the same time, cooperates with the Office of Industrial Product Standard, Ministry of Industry, in food product analyses.

1.2. Microbiological Laboratory: The activity of this laboratory is similar to that of chemical laboratory but only in microbiological area. Among more than 20 research projects are the utilization of microbial cultures for food products and others, such as, wine, vinegar, fermented soybean products, ethyl alcohol and biogas.

1.3. Algae Laboratory: Algae laboratory is for Algae project which was initiated in July 1970 by an agreement between the two governments of the Kingdom of Thailand and the Federal Republic of Germany. The main objectives of the project are to utilize algae as a source of proteins. Selection and cultivation of suitable strain for Thailand. To investigate the production techniques of the mass culture and utilization of algae for food. At first the algae was aimed ~~for~~ food but latter was found unsuitable for human foods because of its strong color and greeny flavor and its aimed for animal feed instead.

1.4. Biological Testing Laboratory: Biological Testing Laboratory was established as part of Algae project. It is a laboratory for evaluating protein quality and toxicity of food products.

1.5. Food Processing Pilot Plant: Besides the laboratories, there is a Food Processing Pilot Plant for research and development works, include the effect of heat processing, heat penetration and processing conditions on a wide range of fruits and vegetables, and for general public services. Many products which were developed at the Institute are now being produced on a commercial basis in H.M.King's Project canneries in Northern Thailand.

Apart from research projects the pilot plant also carries out the routine works which includes:

- Production of canned concentrated soy milk about 20,000 cans (20 oz.) per month for distribution to over 500 Health Center throughout Thailand.

- Providing technological assistance and canning service to other food processing canneries and interested people.

Some of the equipments being used in Pilot Plants are:

- Pilot Plant 1&2. Conical dryer and blancher, Y-type mixer, Pilot Scale, Gaulin Homogenizer, Reiz Mill, Bird Centrifuge, Feed Pump, Kettles with Agitators, Shredder, Screw Press, Cookers, Churry Burrel Homogenizer, Paddle Stirrer, Paddle Stirrer and Tanks, Freeze dryer, Chiller, Band Saw, Centritherm, Can Closer, Vacuum Closer, Exhauster, Retorts, Decanter, Sausage machine.

- Pilot Plant 3: Ribbon Mixer, Pressing and Cutting Rollers, Fisher Balance, Electrical Ovens, Blade Mixer, Filling machines, Steam Cabinet Dryer, Crown Capper, Stone Grinder, Rice Cleaners.

- Pilot Plant 4: Wenger extruder, Preconditioner, Feeder, Cutter, Air Compressor, Belt Conveyor, Continuous Belt Dryer, Hammer Mill, Scourer(Dehuller), Dresser(Cracker), Dust Collector, Alpine Mill, Stud Mill, Weighing machine, Volumetric Filling machine, Concrete Mixer, Food Mixer, Drum Dryers, Disc Centrifuge, Spray Dryer.

Some complete production line being used:

- Baby food production

- Cookies production

- Algae production

- Soymilk production

- Kaset Protein, Meat Analog, Snacks, and etc.

- Rice noodle production

2. Food Science and Technology Information Center of Thailand(FSTICT).

The Food Science and Technology Information Center of Thailand was formed recently by IFRPD through the recognition of the necessity and needs of datas and informations required for the development of Food Science and Technology in the country in terms of technology transfer. The purpose of this Center is to create a series of food science and technology informations of Thailand or informations of those related to the country. (See appendix C for further informations).

Functions of IFRPD in accordance to the National Food and Nutrition Policy.

In the Fourth Plan, the Government promotes the status of food and nutrition to solve the problem of malnutrition. The production of high protein foods is encouraged and at the same time the Government is promoting the production of raw materials such as soy bean, mung bean, and other plants which are used to produce infant and high-protein foods.

With respect to the production and distribution of Protein Supplemented foods, the Institute of Food Research and Product Development at Kasetsart University has been assigned from the National Food and Nutrition Board to work in cooperating with the Ministry of Public Health to promote the production of 32,126.95 tons of such foods for 628,750 children (6 months-2 years old). In addition, 6,236.2 tons of supplementary foods is provided for 748,500 pre-schoolchildren (3-5 years old).

Role of IFRPD in Agro-Industries

The IFRPD carries on research work to improve and to produce food of low cost but high in nutritive value using local available agricultural products.

1. Food Research and Product Development.

The staple food of Thai people is rice which has the carbohydrate as its main composition. Fat and Protein food has been consumed only in small quantity. Poverty is the main reason why food consumption is not sufficient to meet daily requirement and therefore, among the population group at large, especially, the labour intensive groups such as farmers, labours, monks, and soldiers, malnutrition problems are common. To raise up the standard of living of this group of people is thus an urgent requirement and IFRPD has chosen to solve the problem by promoting not only the utilization of local agricultural products such as soybean but also the development of high nutritive food at low cost.

Since Thailand is an agricultural country, there are many kinds of agricultural products all year round. The IFRPD utilizes various kinds of fruits in season to produce wine and vinegar. These fruits are also canned and preserved by drying. To encourage people to preserve these fruits for off-season consumption and to promote them to have their own food plants, the IFRPD has proceeded to transfer the technology-know-how on the preserved food production techniques and also on canning techniques to the new food processors.

2. Assistance of IFRPD to Food Factories.

2.1 Assistance in Economics point of view

The IFRPD food research and development of high-protein low cost food products is one means to utilize the agricultural

waste materials and therefore assists in solving the economic problems of some factories by the increasing of factory income from waste. For instance, isolated mung protein, a main ingredient for Kaset protein, is obtained from noodle which is the by-product obtained from vermicelli factory, is used in the production of meat analog of 60 percent protein.

2.2 Assistance in Preservation of Food

Services in packaging for the new food industrial investors who have not quite ready in mechanization for food production are given by IFRPD for a little charge. This is to encourage small industrial investors who were interested in food industry to have the opportunity to introduce their products to the market in order to test the acceptability and its demand before spending big investment into the new set up factory. For example, IFRPD had canned some food products for exportation for many companies. Such products were Abalone mushroom, salted crab, and fried Indo-pacific Mackerel.

2.3 Assistance in Quality Control of food Products

In order to obtain food products of good quality and standards for consumption, assistance is given to various factories pertaining to chemical and microbiological tests for food quality especially the factories which do not have the quality control laboratory. IFRPD has a Mobile Q.C. Unit given by CIDA specially for the convenience of this assignment.

In some cases, the Institute has also analyzed food samples to assist in the development of new standards and to check whether certain companies are complying with such standards.

2.4 Certification of Qualified Food Product for Export.

IFRPD has been authorized to certify food products which has passed all standards for quality test.

His Majesty The King's Projects

It is the aims of His Majesty the King to give assistance to the hill tribes in Northern Thailand through the Hill Tribes Programme. The Institute has been participated in this programme by assisting in the establishment of 2 canneries, at Ban Yang village, Fanf district, Chieng Mai Province and at Pa-Sang village, Mae Chan district, Chieng Rai province, in an effort to turn crops grown by hilltribes into an industry. Plans to establish other similar ventures in other rural areas particularly in the North, are underway.

IFRPD also carries out rural development program as being suggested by His Majesty the King to raise up the standard of living of the poor villagers in Na Ngoy and Pon Pla Loh villages in Sakon Nakorn Province of the Northeastern part of Thailand since late in 1980.

Food and Nutrition Foundation

In Thailand, the poverty of the population at large is the main cause of malnutrition problems. IFRPD recognized the important of this problem and has thus founded the Food and Nutrition Foundation in 1979 in order to distribute better nutrition foods to those who from the poor families.

